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Parkhurst, Gregory M and Shogren, Jason F

Weber State University

2011

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Gregory M. Parkhurst
Jason F. Shogren*

Abstract. We use data from Vickrey uniform auctions to provide an indirect robustness test of the endowment effect idea that people treat opportunity costs differently from out-of-pocket costs. The panel data suggests two results: (1) evidence of the endowment effect exists—risk seeking behavior after a loss is less severe for 'out of pocket' losses relative to foregone gain. We found no support for the prediction that bidders recoil from future losses following a realized loss (i.e., become more risk averse); and (2) a form of gamblers fallacy termed the *escalation of commitment* better explains bidding behavior for inexperienced bidders—risk seeking bidding behavior is observed following a loss. But as bidders gain experience the escalation of commitment is attenuated for "out of pocket" losses but not for foregone gains.

*Gregory M. Parkhurst is a Visiting Professor in the Department of Economics at Weber State University. Jason Shogren is the Stroock Distinguished Professor in the Department of Economics and Finance at the University of Wyoming.

1. Introduction

Do people treat opportunity costs differently from out-of-pocket costs? The answer is 'yes' if you accept the behavioral notion of the endowment effect—people value goods in their possession more than identical goods they do not own (see Kahneman et al., 1986, 1990, 1991). Kahneman et al. (1991) state "[A]n implication of the endowment effect is that people treat opportunity costs differently than "out of pocket" costs. Foregone gains are less painful than perceived losses" (pp. 203). Real pocketbook expenses affect behavior more than abstract notions of "the path not taken", i.e., foregone gains.[1] Herein we examine this conjecture indirectly by examining bidding behavior in a classic demand revealing Vickrey auction experiment.[2] In the auction, overbidding risks real out of pocket costs when the price exceeds value; whereas underbidding risks foregoing a valuable opportunity. If the endowment effect holds, over-bidders should become more risk averse with 'out of pocket' losses relative to foregone gains.[3]

Using a two way fixed effects model with inexperience (rounds 2-10) and experience (rounds 11-20) bidders, we cannot reject the endowment effect influence on bidding behavior. However, we do note the expected reaction was not observed. Rather another behavioral phenomenon better explains the behavior of inexperienced bidders—the *escalation of commitment*[4] as bidders become more aggressive after a loss (see Staw, 1976; Weber and Zuchel, 2005).[5] We observe risk seeking bidding behavior following an out of pocket loss for inexperienced bidders. As bidders gain experience with the auction,

[1] Loomes et al. (2003) market discipline hypothesis is similar to this Kahneman et al. (1991) definition of the endowment effect. The primary difference is Kahneman et al. (1991) suggest the marginal effect of "out of pocket costs" will exceed the marginal effect of foregone gains. The market discipline hypothesis proposes costly losses will cause people to adjust behavior towards predictive behavior.

[2] Recall in the Vickrey (1961) uniform auction, the weakly dominant strategy is to bid ones true value; profits are maximized when the individual's bid is demand revealing. The notion of the endowment effect has been attached to bidding behavior in auctions in previous research. van Dijk and van Knippenberg (1996) find an endowment effect in a bargaining chip market with uncertain prices. Bidders underbid their stated WTP to avoid losses. van de Ven et al. (2005) find that the endowment effect may be impacted by bidders curiosity over uncertain prices, when only bidders in possession of a bargaining chip are provided market price at the conclusion of the auction.

[3] This form of the endowment effect is consistent with Thaler and Johnson's (1990) "house money effect" hypothesis where individuals become more risk averse following a loss. Thaler and Johnson (1990) do find evidence that people will take on more risk following a loss if the gamble is a break even bet. In a Vickrey auction betting one's own value maximizes the payoffs without incurring any risk, therefore, risk seeking behavior only serves to increase the potential for losses with no added gain.

[4] See Croson and Sundali (2005).

[5] Staws (1976) escalation of commitment hypothesis is commonly applied to risky investment decisions and is akin to the disposition affect (see Weber and Zuchel, 2005).

their bidding behavior remains constant following a loss. For bidders who suffered through foregone gains, risk-seeking bidding behavior was evident with and without auction experience.

2. Experimental Design

To test the hypotheses here, we use data from bidding behavior within two Vickrey auctions—the uniform 2nd-price and random nth-price WTP auction. The data comes from two experimental studies—Parkhurst et al. (2004) and Shogren et al. (2006). The specific details of each study (e.g., the distributions of induced values) are found in these papers, we now briefly highlight the design of the experiments to illustrate why we can use the data to focus on individual responses to "out of pocket" costs and foregone gains. Both auctions have the same weakly dominant strategy, and profit maximizing bidding behavior. If you overbid and the market clearing price falls between your bid and induced value you earn negative profits ("out of pocket" loss) or if you underbid and the market clearing price is less than your induced value you experience a foregone profitable opportunity (foregone gains).

Three sets of experiments were conducted at the University of Wyoming. Students were recruited from undergraduate economic courses and asked to show up at an experimental lab at a specified time. Subjects were given the experimental instructions, which the monitor read aloud. Subjects were encouraged to ask questions to reduce any misconceptions.[6] The instructions were identical (except for the market clearing price information, either the 2nd or random nth highest bid), and used a nine step process. *Step 1*: each bidder received a value sheet that had his private resale value for the round. The bidder's resale value is the price the monitor pays if he were the highest bidder. *Step 2:* bidders learned the rules of the auction mechanism. For the 2nd price auction, the highest bidder buys the good at the price set by the 2nd highest bid. In the random nth

[6] Misconceptions are still feasible. Our question and answer period (training) was less extensive than in Plott and Zeiler (2005). Further our subjects were not provided paid or hypothetical practice rounds; bidders were allowed to learn through actual market experience (see Shogren et al., 1994).

price auction, the (n -1) highest bidders buy the good at the price set by the random n^{th} highest bid.[7] Bidders were not informed of the optimal strategy. *Step 3*: the monitor ranked the bids from highest to lowest. *Step 4*: the second highest (or random n^{th} highest) bid set the market-clearing price. *Step 5:* the monitor posted the market-clearing price as public information. *Step 6*: the highest bidder(s) purchased one unit of the good at the market price. *Step 7:* the highest bidder(s) then sold the unit back to the monitor at his assigned resale value for that auction. The bidder's profits equaled the difference between his resale value and the market-clearing price for that round: *profits = resale value – market price.* Subjects knew negative profits were possible; profits were private information. *Step 8*: bidders at or below the market-clearing price did not purchase the good and recorded zero profits. *Step 9:* the round ended; they returned to *Step 1*.

Subjects maintained a record sheet on which they recorded their induced values, bids, market price, and profits or losses for each round. Profit calculations were double checked by the monitor following each round. The experimental design biases our results towards revelation of an endowment effect because each subject is given information that identifies when they incur an 'out of pocket' loss, e.g., negative profits, but subjects did not get explicit information when they forego profitable opportunities.

All subjects were paid a $5 show up fee. The experimental instructions and the experiment monitor explained that final take-home pay would be $5.00 + aggregate earnings. Subjects were responsible for all losses and losses could erode into the show up fee. Subjects maintained a running total with final payoffs being paid at the end of the experiment.

3. A Reduced Form Model

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[7] See Shogren et al. (2001b) for an overview and introduction to the random n^{th} price auction.

To examine the influence of the endowment effect and the escalation of commitment on bidding behavior, we use the following reduced-form model:

$$Bid = f(IN, LLoss, LOC, LGain) \quad (1)$$

Equation (1) specifies bid (*Bid*) as a function of induced value (*IN*), prior period loss (*LLoss*), prior period foregone gains (*LOC*), and prior period profits (*LGain*). The theory underlying the Vickrey second price auction posits a weakly dominant strategy of demand revelation within an auction and independence across auctions. If theory holds, expected marginal effects are:

$$\frac{\partial Bid}{\partial IN} = 1 \quad (2)$$

$$\frac{\partial Bid}{\partial LLoss} = 0 \quad (3)$$

$$\frac{\partial Bid}{\partial LOC} = 0 \quad (4)$$

$$\frac{\partial Bid}{\partial LGain} = 0 \quad (5)$$

Given the theoretical results, we redefine the dependent variable as the deviation of the bid from the induced value (*Bid – IN*), and represent equation 2 as:

$$dev = Bid - IN = f(LLoss, LOC, LGain) \quad (6)$$

Eq. 6 indicates the bid-induced value deviation is a function of prior period losses (*LLoss*), prior period foregone gains (*LOC*), and prior period profits (*LGain*).

For a bidder to have incurred a loss in the prior auction (*LLoss* > 0), he would have been the highest bidder, and his induced value was less than the market price which is less than his bid (*IN* < Price < *Bid*). In this case, bid - induced value deviation would be positive.

To have incurred a foregone gain in the prior auction (*LOC* > 0), the bidder would need to have not been the highest bidder (second highest bidder or lower), and his induced value must be greater than the market price which is greater than or equal to his bid (*IN* > Price ≥ *Bid*). In this case, bid – induced value deviation would be negative.

Finally, to have incurred a gain in the prior auction (*LGain* > 0), the bidder would need to have been the highest bidder, and his induced value must be greater than the market price (*IN* > price; *Bid* > Price). The bid – induced value deviation could be positive or negative with the lower bound being bid equal to market price plus one cent less induced value (*Bid* = price + 0.01 – *IN*).

Endowment Effect

If bidders do adjust behavior in accordance with the associated pain, and "out of pocket" expenses are more painful than foregone opportunities (Kahneman et al., 1991), we expect bidders will adjust their bidding behavior more expediently when incurring a realized loss. The expected marginal effects are:

$$\frac{\partial dev}{\partial LLoss} < 0 \tag{7}$$

$$\frac{\partial dev}{\partial LOC} > 0 \tag{8}$$

with

$$\frac{\partial dev}{\partial LLoss} > \frac{\partial dev}{\partial LOC} \tag{9}$$

Escalation of Commitment

Escalation of commitment suggests bidders will commit further into the present strategy when losses or foregone gains are encountered. Escalation of commitment can be characterized as *throwing good money after bad* or *doubling down on a bad strategy*. Here, the expectation would be for deviations to become larger following a loss as people bid more aggressively to win. For foregone gains, the deviation will become smaller (a larger negative). The expected marginal effects are:

$$\frac{\partial dev}{\partial LLoss} > 0 \qquad (10)$$

$$\frac{\partial dev}{\partial LOC} < 0 \qquad (11)$$

We would expect the marginal effect on prior gains to be zero.

4. Results

Table 1 reports bidding behavior across all rounds for both auctions and different subsets of each auction. Starting with the statistics on deviations, on average people overbid their induced values by \$0.49 with a variance of 20.98. Maximum and minimum deviations are 45.60 and -26.40.[8] Focusing on rounds 2-10 (Table 1, column 2) we see that the majority of the variance (30.81) can be explained in the early rounds—when people are figuring out the intricacies of the institution. In latter rounds (column 3) the variance (12.10) is much smaller although a couple of relatively large deviations are still present. Further, overbidding was greater in early rounds (dev = 0.77) than in latter rounds (dev = 0.24). In the n^{th}-price auction, deviations indicate people underbid by \$0.03 with variance (40.88) and maximum (45.60) and minimum (-48.50). In early rounds (2-10) of the random n^{th}-price auction bidders overbid by 0.42 and in latter rounds (11-20) underbid by 0.42. Similar to the 2^{nd} price auctions, variances were distinctly larger in early rounds (55.58) relative to later rounds (27.82).

Turning now to losses, we see that average losses are \$6.06 with losses being larger in early rounds (6.65) relative to later rounds (4.96). The variance across losses also decreases in

[8] We exclude outliers in which the absolute value of the deviation was greater than \$50.00, which consisted of 14 observations in the 2^{nd} price auction and 36 in the random n^{th} price auction. The end result in the 2^{nd} price auction is a change in the deviation from 0.33 to 0.49 and a change in the variance from 1453 to 21.66. In the random n^{th} price auction, -2731.06 to -.03 and change in variance from 2.64E+09 to 40.88. See Appendix 1. For the random n^{th} price auction strategic bidding behavior was observed (see Parkhurst et al., 2004).

later rounds. Note that some relatively large losses were experienced (max = \$39.90). In the random nth-price auction losses were much smaller (\$3.15) with a tighter variance (8.82) and the maximum was \$12.80. Also, average losses were larger in early rounds (4.01) relative to later rounds (2.03). For OC the average missed opportunity and variance were small (\$0.63). Again, average OC decreased with experience, \$0.75 to \$0.48. Note, in the 2nd price auction the average loss is roughly 10 times greater in magnitude than the average OC, implying bidders will likely pay more attention to larger 'out of pocket' costs then they would smaller foregone gains, further biasing our results towards evidencing an endowment effect (see Shogren et al. 2006). In the random nth-price auction OC, \$1.22, was much closer to the observed losses, but still losses are roughly 2.5 times larger on average. Here again, average opportunity cost decreased with experience from 1.31 to 1.15.

4.1. *Econometric Analysis*

We examine the auction data using conditional panel regression analysis. Assume deviations of bids from induced values (*bid-IN*) are explained by the previous rounds losses, gains, and opportunity costs. We use a fixed effects model to test how prior rounds gains, losses and OC affect bidding:

$$dev_{i,t} = \; bid_{i,t} - IN_{i,t} \; = \alpha + \beta_1 LLoss_{i,t-1} + \beta_2 LOC_{i,t-1} + \beta_3 LGain_{i,t-1} + \mu_i + \varphi_t + \varepsilon_{i,t} \quad (12)$$

where $bid_{i,t}$ is bidder *i*'s bid in round *t*; $IN_{i,t}$ is *i*'s induced value in round *t*; $LLOSS_{i,t-1}$ is *i*'s negative profit in round *t-1*. If bidder *i* did not experience a negative profit in round *t*-1, $LLOSS_{i,t-1} = 0$; $LOC_{i,t-1}$ is *i*'s foregone opportunity cost in round *t-1*. $LOC_{i,t-1} = 0$ when *i* did not experience a foregone opportunity in round *t-1*; $LGAIN_{i,t-1}$ is *i*'s positive profit in round *t-1*. If bidder *i* did not experience a positive profit in round *t*-1, $LGAIN_{i,t-1} = 0$; u_i is an individual fixed effect representing subject-specific characteristics; φ_t represents trial-specific fixed effects, including learning or other trends in bidding behavior; and ε_{it} is iid error.[9] In equation (12) demand revelation implies: $\alpha = \beta_1 = \beta_2 = \beta_3 = \mu_i = \varphi_t = 0 \ \forall i,t.$

4.2. *Predictions.*

We test two hypotheses: (1) *Endowment effect*. If the endowment effect exists in our auction data we expect $\beta_1 < 0$ and $\beta_2 > 0$. Also, if a priori expectations on β_1 and β_2 are met, we expect more risk averse bidding behavior after out of pocket losses, therefore $(\beta_1 + \beta_2) < 0$.[10] People who incur losses, either "out of pocket" or foregone gains, will bid more accurately in the subsequent round. Recall, a loss occurs if the person overbids and a foregone gain if the person underbids. More accurate bidding will reduce the observed deviation for *LLoss* and increase the observed deviation for *LOC*. People are impacted more severely with a loss relative to a foregone gain.[11]

(2) *Gamblers Fallacy/Escalation of Commitment*. If the escalation of commitment explains behavior (see Staw, 1976), we expect $\beta_1 > 0$ and $\beta_2 < 0$. If bidders see rounds as interdependent and prior losses affect future gains people will bid more aggressively taking on more risk following a loss. If overbidding does results in gains in future rounds bidders can justify their dominated bidding behavior as having the 'appearance' of being rational (Festinger, 1957).

[9] The Hausman test supports the use of a fixed effect over random effects at a minimum of 5% for all samples (see Green, 1997, p. 632-633). The two way random effects provide similar results (see Table 4).

[10] Alternatively, if $\beta 1 > 0$ and $\beta 2 < 0$, the endowment effect may still exist if we see risk seeking behavior is greater for *LOC* relative to *LLoss*, or $\beta 1 < |\beta 2|$, implying $(\beta 1 + \beta 2) < 0$.

[11] Our study does not lend itself to an examination of *gain seeking* behavior. Gain seeking is the opposite of loss aversion and is defined as people placing a greater value on gains than on the equivalent loss (see Brooks and Zank, 2005; Bleichrodt and Pinto 2002; Abdellaoui et al., 2005). Bidding behavior in uniform auctions is not conducive to discerning between loss aversion, gain seeking, and loss neutrality. Overbidding in an auction has two convoluting effects—changes in expected market price and changes in the probability of winning, both effecting expected profits. But once stung by a loss, loss aversion would predict the individual to recoil from future losses by bidding more accurately or perhaps even underbidding in subsequent rounds. The observed tendency of people to follow a foregone gain (caused by underbidding) with an increase in the magnitude of underbidding is also not conclusive evidence of loss aversion. Although underbidding reduces the likelihood of people incurring an 'out of pocket' loss to zero, and may be a manifestation of loss aversion, it could also be a result of an individual's misconceptions (Plott and Zeiler, 2005) or people strategically underbidding their value in an attempt to acquire a deal (Brown, 2005).

Result 1. *As expected given the biased nature of our data, an endowment effect is observed overall observations for inexperienced and experienced bidders in the 2nd price auction. In the random nth price auction, we find no evidence of the endowment effect.*

Support. From Table 3, for the 2nd price treatments, we see the coefficient on *LOC* is negative and significant overall observations and for both inexperienced and experienced bidders in the 2nd-price auction. Also, the estimated coefficient on *LLOSS* is positive and significant overall observations and for inexperienced bidders and positive and insignificant for experienced bidders. Both coefficients are opposite of the predicted signs. In the random nth-price treatment, the estimated coefficient on LOC is not significantly different from 0 for all observation or for inexperienced or experienced bidders. The coefficient on LLOSS is either positive or not significantly different from zero for all three regressions. Overall, bidders who experience a loss either have constant bidding behavior or become more risk seeking, exactly opposite of the bidding behavior predicted by the endowment effect. We cannot, however, rule out the existence of the endowment effect in the second price auction overall and for experienced bidders because the proportional risk seeking behavior was greater following a foregone gain than an out of pocket loss.[12]

Result 2. *Inexperienced bidders in the 2nd-price auction are subject to a form of the gamblers fallacy termed escalation of commitment. Bidders become more risk seeking following a loss. The escalation of commitment disappears, however, for experienced bidders who experienced an 'out of pocket' loss; but escalation remains for those who had foregone gains.*

Support. For inexperienced bidders (Table 3 column 2), we observe the coefficient on *LLOSS* is positive (0.28) and statistical different from zero at the 1% significance level—the *bid - IN* deviation increases 0.28 for each dollar increase in *LLOSS.* From Table 2, column 2 we see the average loss is 0.50, which implies a 0.14 increase in deviation per observation. Further, from

[12] A test of the null hypotheses, H_O: $(\beta 1 + \beta 2) \geq 0$ yields the following t-statistics: 2nd price auction rounds 2-20, t = -2.06; rounds 2-10, t = -1.19; rounds 11-20, t = -4.04. For the random nth price auction rounds 2-20, t = -0.50; rounds 2-10, t = -1.22; and rounds 11-20, t = -0.55.

Table 1 we see the average loss is $6.65 so *bid-IN* deviations increase by 1.86 on average following a loss. The coefficient on *LOC* has a negative coefficient estimate (-0.99) which indicates the range for foregone opportunities increases following a prior period opportunity cost. The mean bid decreased by $0.71 following an OC.

For experienced subjects, the coefficient on *LLOSS,* though negative (-0.12), is not statistically different from zero. *Bid-IN* deviations are unaffected by prior losses. Subjects appear to be learning in early rounds and then converging to a stable bidding strategy in later rounds. The escalation of commitment by bidders seems to be a misconception that vanishes with experience.[13] Plott and Zeiler (2005) observe in an incentive compatible BDM auction subjects initially do not seem to realize that overbidding can result in negative profits. These misconceptions were attenuated with training and experience (see also Shogren et al., 1994, 2001a). Our results for out of pocket losses support this observation.

But for foregone opportunities subjects do not seem to be internalizing their losses and do not tend to correct their bidding strategy, as observed by the increased commitment to underbidding. Peoples' absolute bid deviations increased on average by $1.20 following an OC. People do not seem to be realizing the error in their bidding and continue to search for a bid deviation that makes their dominated strategy successful.[14]

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[13] Weber and Zuchel (2005) find escalation of commitment—or risk seeking following a loss exists in institutions that are framed to be interdependent. In theory, an X-round uniform auction is assumed to be X independent auctions. But some bidders may view the experiment as an interdependent auction of X rounds. Interdependence between auctions could exist if bidders regard the final outcome of the experiment as their change in wealth. They would not update their reference point after each round; instead they maintain a reference point associated with initial wealth. Gains and losses within the experiment serve to add to or subtract from their show up fee. Because experiments rarely force subjects to incur costs over show up fees payoffs for participation are truncated at zero. Bidders' final payoffs fall on the gain side of the utility function. The implication is a loss of Y in round *t* shifts the bidder into the loss domain of the S-shaped utility function, in which they could view risk seeking behavior in round *t*+1 as providing a greater increase in gains relative to losses.

[14] One idea is that loss aversion without endowment effect is another possible explanation for deviations from true value. Although loss aversion without endowment effect applies to auctions for specific goods, and not necessarily for induced values (Brown, 2005), the implication in an induced value uniform WTP Vickrey auction is for subjects to bid less than or equal to their induced value regardless of the prior periods outcome. For behavioral evidence of

5. Conclusion

Did our bidders treat opportunity costs differently from out-of-pocket costs? Yes, but not for the reasons one might expect based on the endowment theory. Our regression results suggest that the *escalation of commitment* notion better organizes loss-driven bidding behavior than the classic endowment effect. We observe inexperienced bidders influenced by prior "out of pocket" losses, although the influence wanes as they gain experience (see Shogren et al., 1994; Plott and Zeiler, 2005). But bidders do not seem to internalize foregone gains; although we do not rule out the endowment effect, bidders instead continue to escalate their commitment to an inferior strategy. These results are consistent with the results of Biel et al. (2011) and Martinez et al. (2011) given "out of pocket" costs are more apparent to bidders relative to foregone gains. Emotions, regret and disappointment are likely to have a larger impact on correcting bidding behavior following an a "out of pocket" loss. Additional work might consider a more direct test that explicitly informs bidders of both "out of pocket" costs and foregone gains. This would provide information to bidders such that both forms of losses would be transparent and then internalized.

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loss aversion without endowment effect, we would expect the constant term to be negative (bid – induced value < 0), and the coefficients on *LLoss*, *LOC*, and *LGain* to not differ from zero statistically. Only one sample, experienced bidders in a random n^{th} price auction (Table 3) support this conjecture. All inexperienced bidders as well as experienced second price uniform auction bidders did not behave as would be explained by loss aversion without endowment effect.

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Table 1. Sample Characteristics[&]

	(1) 2^{nd} (2-20)	(2) 2^{nd} (2-10)	(3) 2^{nd} (11-20)	(4) N^{th} (2-20)	(5) N^{th} (2-10)	(6) N^{th} (11-20)
Deviations						
#	2076	979	1097	1104	514	590
Mean	0.49	0.77	0.24	-0.03	0.42	-0.42
Median	0	0	0	0	0	0
Variance	20.98	30.81	12.10	40.88	55.58	27.82
Max	45.60	45.60	45.60	45.60	45.60	16.20
Min	-26.40	-26.40	-23.20	-48.50	-45.60	-48.50
Loss						
#	114	74	40	85	48	37
Mean	6.06	6.65	4.96	3.15	4.01	2.03
Median	4.50	5.00	3.23	2.10	2.40	1.60
Variance	45.31	58.34	20.18	8.82	11.49	3.30
Max	39.90	39.90	17.70	12.80	12.80	7.25
Min	0.01	0.01	0.20	0.05	0.05	0.10
OC						
#	100	54	46	107	46	61
Mean	0.63	0.75	0.48	1.22	1.31	1.15
Median	0.30	0.40	0.20	0.85	0.68	0.90
Variance	0.56	0.68	0.40	2.34	2.94	1.91
Max	4.10	4.10	2.40	8.70	2.89	6.90
Min	0.01	0.01	0.01	0.01	0.01	0.01
Gains						
#	123	41	82	309	143	166
Mean	1.36	1.70	1.18	2.57	3.11	2.36
Median	1.15	1.40	1.11	2.32	2.42	1.90
Variance	1.01	1.64	0.63	3.10	3.37	2.80
Max	6.00	6.00	5.30	7.50	7.50	6.90
Min	0.01	0.10	0.01	0.09	0.10	0.09

[&] Deviations > 50.00 omitted

Table 2. Descriptive Statistics[&]

	(1) 2nd (2-20)	(2) 2nd (2-10)	(3) 2nd (11-20)	(4) Nth (2-20)	(5) Nth (2-10)	(6) Nth (11-20)
DEV	0.49	0.77	0.24	-0.03	0.42	-0.42
	(4.58)	(5.55)	(3.48)	(6.39)	(7.45)	(5.27)
LLOSS	0.33	0.50	0.18	0.24	0.37	0.13
	(2.09)	(2.73)	(1.26)	(1.17)	(1.55)	(0.67)
LOC	0.03	0.04	0.02	0.12	0.12	0.12
	(0.21)	(0.26)	(0.16)	(0.60)	(0.63)	(0.56)
LGAIN	0.08	0.07	0.09	0.72	0.79	0.66
	(0.40)	(0.43)	(0.38)	(1.49)	(1.60)	(1.38)

Table 3. Panel Data Regression Results—Two Way Fixed Effects.[&]

	2^{nd} (2-20)	2^{nd} (2-10)	2^{nd} (11-20)	N^{th} (2-20)	N^{th} (2-10)	N^{th} (11-20)
Constant	0.43*	0.69*	0.33*	-0.06	0.72**	-0.46*
	(0.09)	(0.15)	(0.10)	(0.20)	(0.36)	(0.18)
LLoss	0.31*	0.28*	-0.12	0.27***	-0.02	-0.26
	(0.05)	(0.06)	(0.08)	(0.15)	(0.21)	(0.25)
LOC	-1.21*	-0.99***	-2.49*	-0.44	-0.65	0.04
	(0.43)	(0.59)	(0.63)	(0.30)	(0.50)	(0.30)
LGain	-0.19	-0.30	-0.30	0.23	-0.26	0.11
	(0.23)	(0.36)	(0.26)	(0.13)	(0.22)	(0.13)
Breush-Pagan	$\chi_2^2 = 466.67$	$\chi_2^2 = 245.23$	$\chi_2^2 = 169.83$	$\chi_2^2 = 404.36$	$\chi_2^2 = 74.60$	$\chi_2^2 = 398.45$
	$p < 0.001$	$p < 0.001$	$p < 0.001$	$p < 0.001$	$p < 0.001$	$p < 0.001$
Hausman	$\chi_2^2 = 62.10$	$\chi_2^2 = 44.24$	$\chi_2^2 = 44.37$	$\chi_2^2 = 59.35$	$\chi_2^2 = 24.96$	$\chi_2^2 = 60.11$
	$p < 0.001$	$p < 0.001$	$p < 0.001$	$p < 0.001$	$p < 0.001$	$p < 0.001$
N	2076	979	1097	1104	514	590
R^2	0.29	0.43	0.31	0.34	0.35	0.63

[&] Absolute deviations > 50.00 are omitted

*1%, **5%, ***10%

Table 4. Panel Data Regression Results—Two Way Random Effects.[&]

	2^{nd} (2-20)	2^{nd} (2-10)	2^{nd} (11-20)	N^{th} (2-20)	N^{th} (2-10)	N^{th} (11-20)
Constant	0.39**	0.60**	0.28	-0.16	0.46	-0.55
	(0.18)	(0.29)	(0.19)	(0.37)	(0.60)	(0.46)
LLoss	0.39*	0.40*	0.02	0.41*	-0.22	0.02
	(0.04)	(0.06)	(0.08)	(0.14)	(0.20)	(0.25)
LOC	-1.11*	-0.87	-2.14*	-0.83*	-0.82***	-0.38
	(0.43)	(0.58)	(0.61)	(0.29)	(0.48)	(0.29)
LGain	-0.14	-0.16	-0.25	0.10	-0.19	0.12
	(0.22)	(0.35)	(0.25)	(0.12)	(0.20)	(0.12)
Breush-Pagan	$\chi_2^2 = 466.67$	$\chi_2^2 = 245.23$	$\chi_2^2 = 169.83$	$\chi_2^2 = 404.36$	$\chi_2^2 = 74.60$	$\chi_2^2 = 398.45$
	p< 0.001	p< 0.001	p< 0.001	p< 0.001	p< 0.001	p< 0.001
Hausman	$\chi_2^2 = 62.10$	$\chi_2^2 = 44.24$	$\chi_2^2 = 44.37$	$\chi_2^2 = 59.35$	$\chi_2^2 = 24.96$	$\chi_2^2 = 60.11$
	p< 0.001	p< 0.001	p< 0.001	p< 0.001	p< 0.001	p< 0.001
N	2076	979	1097	1104	514	590
R^2	0.07	0.10	0.01	0.05	0.02	0.09

[&] Absolute deviations > 50.00 are omitted

*1%, **5%, ***10%